Policy Evaluation - Natural Experiments & the Oregon Medicaid Study

March 19 & 21, 2023

Estimating Treatment Effects Review

- $ATE = Avg_n[Y_i^1 - Y_i^0]$

- $ATE_{est} = Avg_n[Y_i^1 | D_i = 1] - Avg_n[Y_i^0 | D_i = 0]$

- When $(Y^1, Y^0) \not\perp D$:

$$ATE_{est} = ATE + \underbrace{\{Avg_n[Y_i^0 | D_i = 1] - Avg_n[Y_i^0 | D_i = 0]\}}_{\text{Selection Bias}}$$

$$+ \underbrace{(1 - \pi)(ATT - ATU)}_{\text{Heterogeneous Treatment Effect Bias}}$$

- $ATE_{est} = \beta_0 + \beta_1 D + \beta_2 X_1 + \beta_3 X_2 + ... \beta_k X_{k-1} + \varepsilon$

- What is a natural experiment?
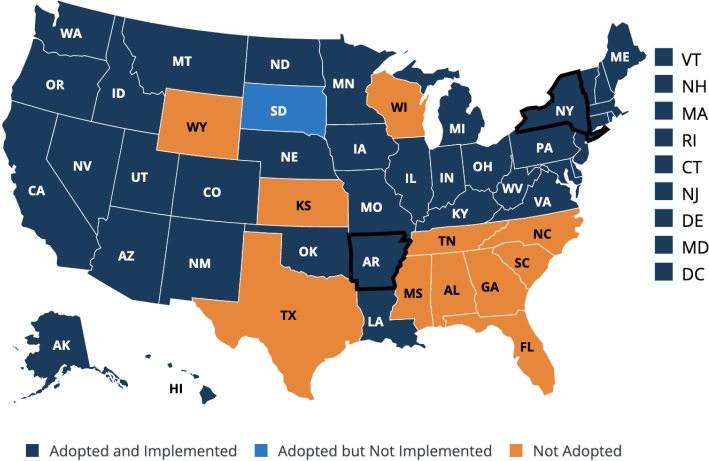
Natural Experiments to Estimate Treatment Effects

Status of State Action on the Medicaid Expansion Decision

Legend: Adopted and Implemented, Adopted but Not Implemented, Not Adopted

Philadelphia Intl. Airport

Terminals A-West and A-East, and a few gates in Terminal B, lie within Tinicum Township.

- - - Philadelphia-Tinicum border

Terminal F (not shown)

Terminal E

Terminal D

Terminal C

Terminal B

Terminal A-East

Terminal A-West

PHILADELPHIA

TINICUM TWP.

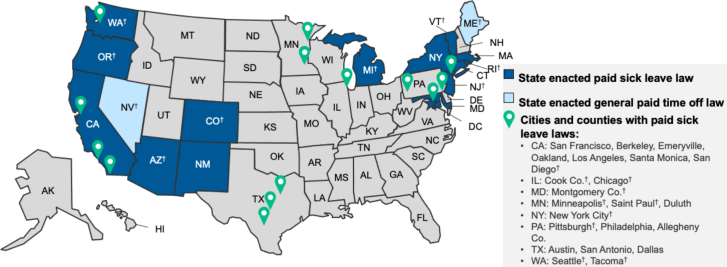SOURCE: U.S. Geological Survey photo, May 2002

JOHN DUCHNESKIE / Inquirer Staff Artist

Natural Experiments to Estimate Treatment Effects

State and Local Paid Sick Leave Laws, 2021

The NEW ENGLAND JOURNAL *of* MEDICINE

SPECIAL ARTICLE

Cancer Screening after the Adoption of Paid-Sick-Leave Mandates

Kevin Callison, Ph.D., Michael F. Pesko, Ph.D., Serena Phillips, Dr.P.H., and Julie A. Sosa, M.D.

- Why are natural experiments valuable when estimating treatment effects?
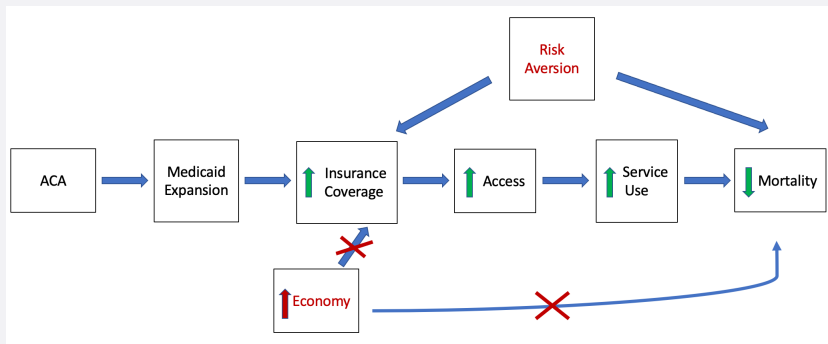
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  - Oregon Health Plan Standard (OHP Standard) - coverage for adults ages 19-64 with income < FPL and assets below $2k.

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- Expand OHP Standard enrollment by 10k in 2008.
  - ▶ 90k people applied

Oregon Health Study
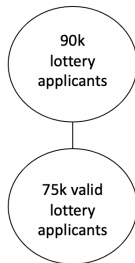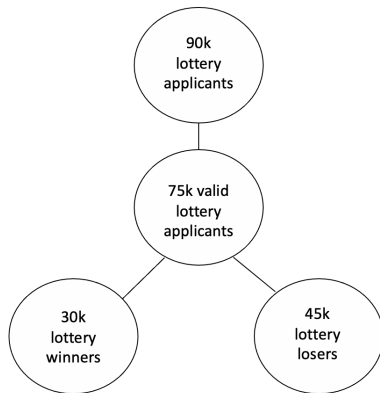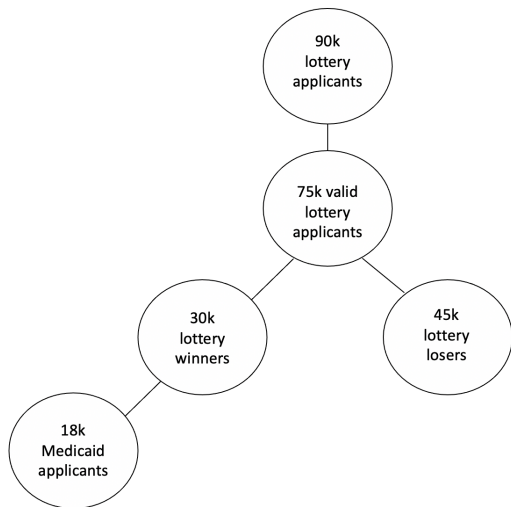
Oregon Health Study

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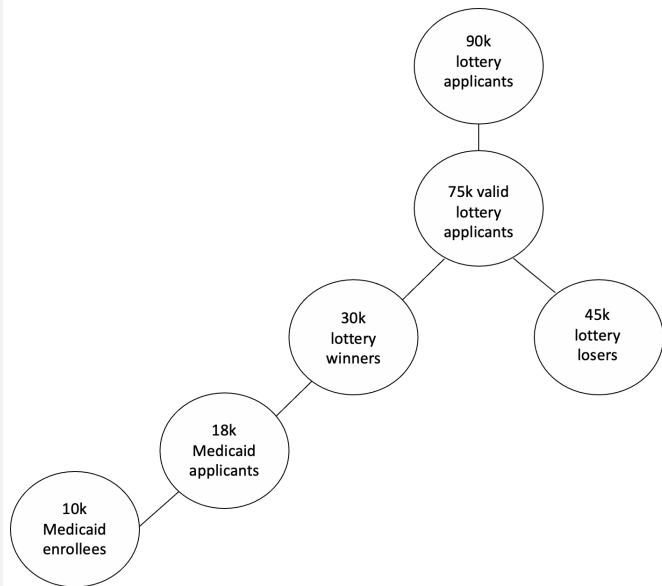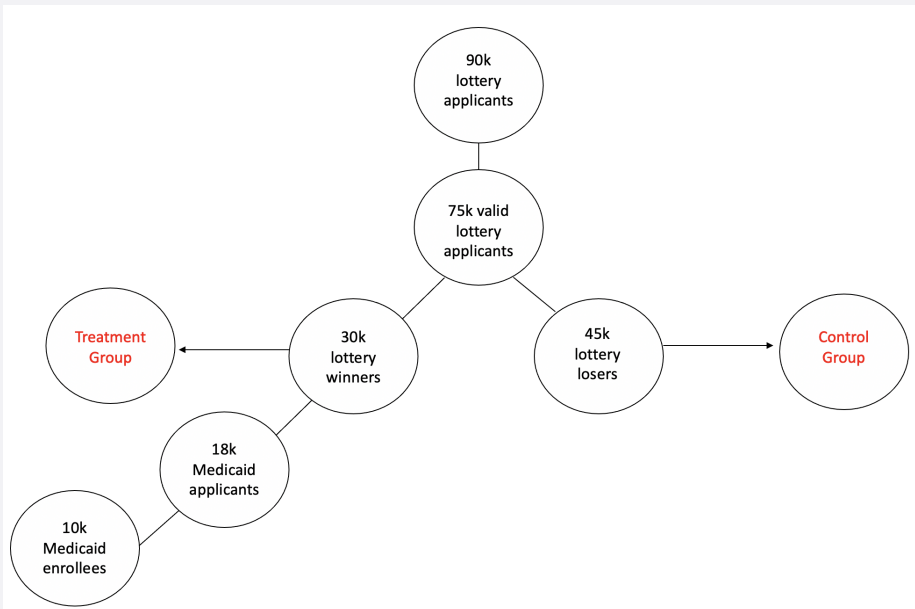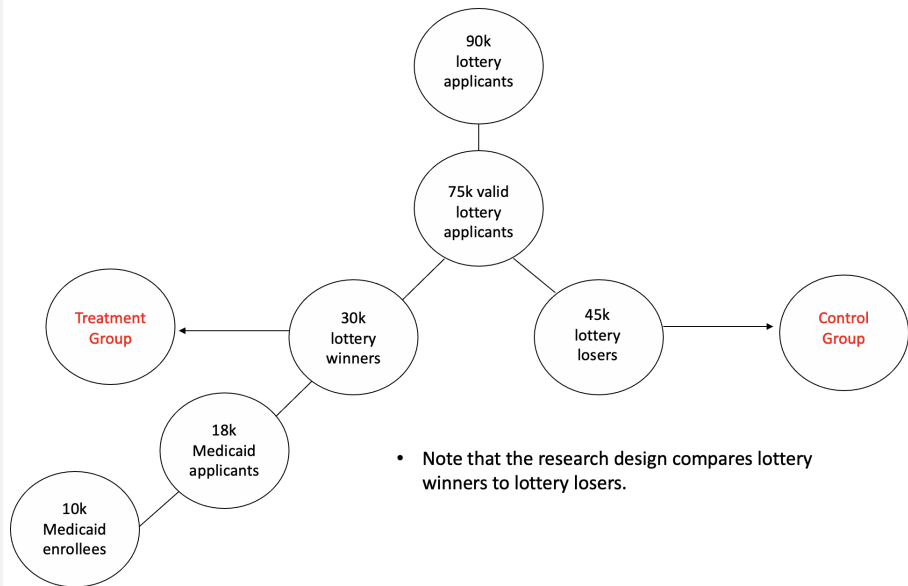
Oregon Health Study
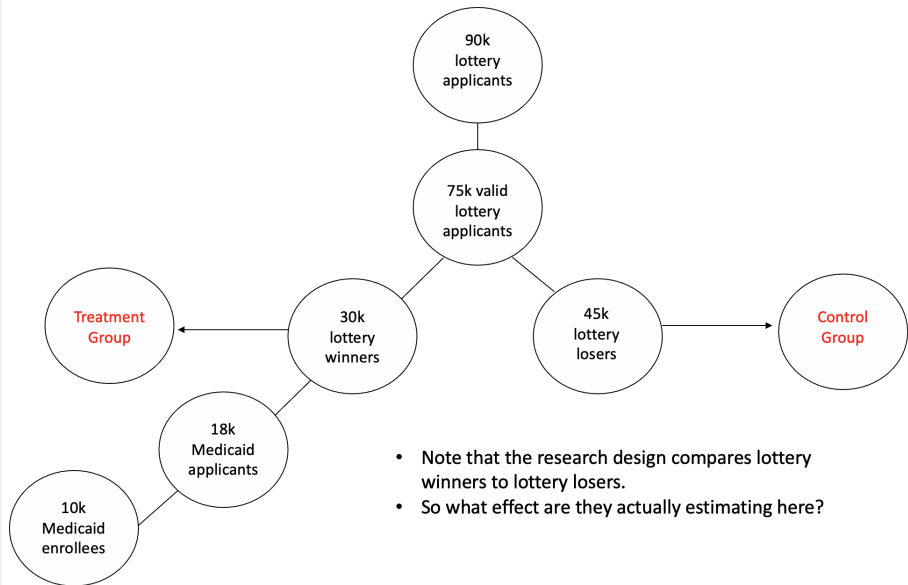
- Note that the research design compares lottery winners to lottery losers.
- So what effect are they actually estimating here?

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Oregon Health Study

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  - ▸ LATE: those who obtain insurance after winning the lottery and who would not have obtained insurance without winning the lottery.
    - How does this distinction between ITT and TOT/LATE relate to the concept of external validity?

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- Balance Test

Table A13: Lottery list characteristics and balance of treatment and controls

	Control Mean (std dev)	Difference between treatment and control		
		Full sample	Credit report subsample	Survey respondents subsample
	(1)	(2)	(3)	(4)
Panel A: Lottery list characteristics				
Year of birth	1968.0	0.162	0.136	-0.066
	(12.255)	(0.100)	(0.119)	(0.191)
Female	0.557	-0.0069	-0.0027	-0.0042
	(0.497)	(0.0033)	(0.0041)	(0.0068)
English as preferred language	0.922	0.0024	0.0042	-0.00033
	(0.268)	(0.0026)	(0.0029)	(0.0048)
Signed up self	0.918	0.00030	0.00060	-0.0016
	(0.274)	(0.00028)	(0.0010)	(0.0027)
Signed up first day of lottery	0.093	0.0012	0.00093	0.0061
	(0.290)	(0.0025)	(0.0031)	(0.0049)
Gave phone number	0.862	-0.0029	0.000088	0.0059
	(0.345)	(0.0028)	(0.0034)	(0.0037)
Address a PO Box	0.117	0.00044	0.0023	-0.0023
	(0.321)	(0.0027)	(0.0034)	(0.0053)
In MSA	0.773	-0.0024	-0.0018	0.0011
	(0.419)	(0.0036)	(0.0044)	(0.0070)
Zip code median household income	39,265.4	44.891	12.998	22.031
	(8463.542)	(72.887)	(89.653)	(135.815)

Oregon Health Study

- Results - Hospital Admissions

	HOSPITAL UTILIZATION			
	Control mean (1)	ITT (2)	LATE (3)	p-values (4)
Panel A: Extensive margin				
All hospital admissions	0.067	0.0054	0.021	[0.004]
	(0.250)	(0.0019)	(0.0074)	
Admissions through ER	0.048	0.0018	0.0070	[0.265]
	(0.214)	(0.0016)	(0.0062)	
Admissions not through ER	0.029	0.0041	0.016	[0.002]
	(0.167)	(0.0013)	(0.0051)	

Oregon Health Study

- Results - Hospital Admissions

		HOSPITAL UTILIZATION		
	Control mean (1)	ITT (2)	LATE (3)	*p*-values (4)
Panel B: All hospital admissions				
Days	0.498	0.026	0.101	[0.329]
	(3.795)	(0.027)	(0.104)	{0.328}
List charges	2,613	258	1,009	[0.077]
	(19,942)	(146)	(569)	{0.106}
Procedures	0.155	0.018	0.070	[0.031]
	(1.08)	(0.0083)	(0.032)	{0.059}

Oregon Health Study

- Results - Hospital Admissions

	HOSPITAL UTILIZATION			
	Control mean (1)	ITT (2)	LATE (3)	*p*-values (4)
Panel C: Admissions through ER				
Days	0.299	0.023	0.089	[0.183]
	(2.326)	(0.017)	(0.067)	{0.187}
List charges	1,502	163	636	[0.091]
	(12,749)	(96)	(376)	{0.171}
Procedures	0.081	0.0080	0.031	[0.135]
	(0.694)	(0.0054)	(0.021)	{0.187}

- Results - Hospital Admissions

	Control mean (1)	ITT (2)	LATE (3)	*p*-values (4)
	HOSPITAL UTILIZATION			
Panel D: Admissions not through ER				
Days	0.199	0.0033	0.013	[0.841]
	(2.38)	(0.017)	(0.065)	{0.842}
List charges	1,110	98	384	[0.281]
	(12,422)	(91)	(356)	{0.383}
Procedures	0.075	0.010	0.038	[0.080]
	(0.708)	(0.0056)	(0.022)	{0.162}

Oregon Health Study

- Results - ED Visits

Perspective

Effect of Medicaid Coverage on ED Use — Further Evidence from Oregon's Experiment

Amy N. Finkelstein, Ph.D., Sarah L. Taubman, Ph.D., Heidi L. Allen, Ph.D., Bill J. Wright, Ph.D., and Katherine Baicker, Ph.D.
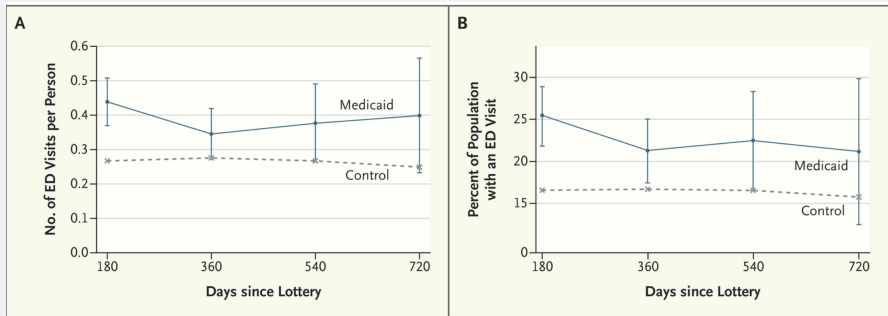
- Results - E&M and ED Visits

Figure 1: Evaluation and Management Visits for Expansion vs. Non-Expansion Beneficiaries
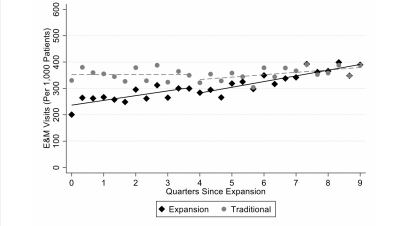
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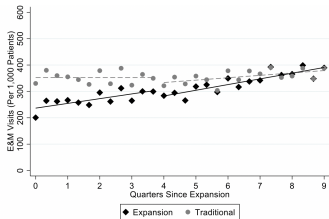
Figure 2: Emergency Department Visits for Expansion vs. Non-Expansion Beneficiaries
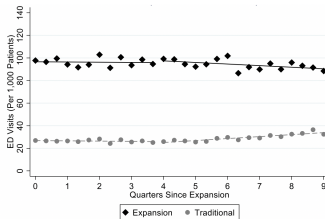
- Results - Preventive Care

COMPLIANCE WITH RECOMMENDED PREVENTIVE CARE (SURVEY DATA)

	Control mean (1)	ITT (2)	LATE (3)	p-values (4)
Blood cholesterol checked (ever)	0.625	0.033	0.114	[<0.0001]
	(0.484)	(0.0074)	(0.026)	{<0.0001}
Blood tested for high blood sugar/diabetes (ever)	0.604	0.026	0.090	[0.0004]
	(0.489)	(0.0074)	(0.026)	{<0.0001}
Mammogram within last 12 months (women $\geq$ 40)	0.298	0.055	0.187	[<0.0001]
	(0.457)	(0.012)	(0.04)	{<0.0001}
Pap test within last 12 months (women)	0.406	0.051	0.183	[<0.0001]
	(0.491)	(0.01)	(0.034)	{<0.0001}

- Results - Financial Strain

	FINANCIAL STRAIN (ADMINISTRATIVE DATA)			
	Control mean (1)	ITT (2)	LATE (3)	*p*-values (4)
Panel A: Overall				
Any bankruptcy	0.014	0.0022	0.0086	[0.106]
	(0.119)	(0.0014)	(0.0053)	{0.358}
Any lien	0.021	0.0012	0.0047	[0.406]
	(0.144)	(0.0014)	(0.0056)	{0.698}
Any judgment	0.064	0.0014	0.0054	[0.573]
	(0.244)	(0.0024)	(0.010)	{0.698}
Any collection	0.500	−0.012	−0.048	[0.003]
	(0.500)	(0.0041)	(0.016)	{0.013}
Any delinquency (credit accounts)	0.366	0.0016	0.0063	[0.704]
	(0.482)	(0.0042)	(0.017)	{0.698}

- Results - Financial Strain

FINANCIAL STRAIN (ADMINISTRATIVE DATA)				
	Control mean (1)	ITT (2)	LATE (3)	*p*-values (4)
Panel B: Medical debt				
Any medical collection	0.281	−0.016	−0.064	[<0.0001]
	(0.449)	(0.0040)	(0.016)	{<0.0001}
Amount owed in medical collections	1,999	−99	−390	[0.028]
	(6733)	(45)	(177)	{0.025}

- Results - Financial Strain

	Financial Strain (Administrative Data)			
	Control mean (1)	ITT (2)	LATE (3)	*p*-values (4)
Panel C: Nonmedical debt				
Any nonmedical collection	0.392 (0.488)	−0.0046 (0.0041)	−0.018 (0.016)	[0.264] {0.455}
Amount owed in nonmedical collections	2,740 (9,492)	−20 (63)	−79 (248)	[0.751] {0.752}

Oregon Health Study

- Results - Financial Strain

	Control mean (1)	ITT (2)	LATE (3)	p-values (4)
FINANCIAL STRAIN (SURVEY DATA)				
Any out of pocket medical expenses, last six months	0.555 (0.497)	−0.058 (0.0077)	−0.200 (0.026)	[<0.0001] {<0.0001}
Owe money for medical expenses currently	0.597 (0.491)	−0.052 (0.0076)	−0.180 (0.026)	[<0.0001] {<0.0001}
Borrowed money or skipped other bills to pay medical bills, last six months	0.364 (0.481)	−0.045 (0.0073)	−0.154 (0.025)	[<0.0001] {<0.0001}
Refused treatment because of medical debt, last six months	0.081 (0.273)	−0.011 (0.0041)	−0.036 (0.014)	[0.01] {0.01}

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- Results - Health

	Control mean (1)	ITT (2)	LATE (3)	p-values (4)
		HEALTH		
Panel A: Administrative data				
Alive	0.992	0.00032	0.0013	[0.638]
	(0.092)	(0.00068)	(0.0027)	
Panel B: Survey data				
Self-reported health good/very good/excellent (not fair or poor)	0.548	0.039	0.133	[<0.0001]
	(0.498)	(0.0076)	(0.026)	{<0.0001}
Self-reported health not poor (fair, good, very good, or excellent)	0.86	0.029	0.099	[<0.0001]
	(0.347)	(0.0051)	(0.018)	{<0.0001}
Health about the same or gotten better over last six months	0.714	0.033	0.113	[<0.0001]
	(0.452)	(0.0067)	(0.023)	{<0.0001}
# of days physical health good, past 30 days*	21.862	0.381	1.317	[0.019]
	(10.384)	(0.162)	(0.563)	{0.018}
# days poor physical or mental health did not impair usual activity, past 30 days*	20.329	0.459	1.585	[0.009]
	(10.939)	(0.175)	(0.606)	{0.015}
# of days mental health good, past 30 days*	18.738	0.603	2.082	[0.001]
	(11.445)	(0.184)	(0.64)	{0.003}
Did not screen positive for depression, last two weeks	0.671	0.023	0.078	[0.001]
	(0.470)	(0.0071)	(0.025)	{0.003}

Oregon Health Study

- Results - Mechanisms

	Control mean (1)	ITT (2)	LATE (3)	p-values (4)
POTENTIAL MECHANISMS FOR IMPROVED HEALTH (SURVEY DATA)				
Panel A: Access to care				
Have usual place of clinic-based care	0.499	0.099	0.339	[<0.0001]
	(0.500)	(0.0080)	(0.027)	{<0.0001}
Have personal doctor	0.490	0.081	0.280	[<0.0001]
	(0.500)	(0.0077)	(0.026)	{<0.0001}
Got all needed medical care, last six months	0.684	0.069	0.239	[<0.0001]
	(0.465)	(0.0063)	(0.022)	{<0.0001}
Got all needed drugs, last six months	0.765	0.056	0.195	[<0.0001]
	(0.424)	(0.0055)	(0.019)	{<0.0001}
Didn't use ER for nonemergency, last six months	0.916	−0.0011	−0.0037	[0.804]
	(0.278)	(0.0043)	(0.015)	{0.804}

Oregon Health Study

- Results - Mechanisms

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POTENTIAL MECHANISMS FOR IMPROVED HEALTH (SURVEY DATA)				
Panel B: Quality of care				
Quality of care received last six months good/very good/excellent (conditional on any)	0.708 (0.455)	0.043 (0.0081)	0.142 (0.027)	[<0.0001]
Panel C: Happiness				
Very happy or pretty happy (vs. not too happy)	0.594 (0.491)	0.056 (0.0074)	0.191 (0.026)	[<0.0001]

Oregon Health Study

- ## Results - Biometrics

Variable	Mean Value in Control Group	Change with Medicaid Coverage (95% CI)†	P Value
Blood pressure			
Systolic (mm Hg)	119.3±16.9	−0.52 (−2.97 to 1.93)	0.68
Diastolic (mm Hg)	76.0±12.1	−0.81 (−2.65 to 1.04)	0.39
Elevated (%)‡	16.3	−1.33 (−7.16 to 4.49)	0.65
Hypertension			
Diagnosis after lottery (%)§¶	5.6	1.76 (−1.89 to 5.40)	0.34
Current use of medication for hypertension (%)§‖	13.9	0.66 (−4.48 to 5.80)	0.80
Cholesterol**			
Total level (mg/dl)	204.1±34.0	2.20 (−3.44 to 7.84)	0.45
High total level (%)	14.1	−2.43 (−7.75 to 2.89)	0.37
HDL level (mg/dl)	47.6±13.1	0.83 (−1.31 to 2.98)	0.45
Low HDL level (%)	28.0	−2.82 (−10.28 to 4.64)	0.46
Hypercholesterolemia			
Diagnosis after lottery (%)§¶	6.1	2.39 (−1.52 to 6.29)	0.23
Current use of medication for high cholesterol level (%)§‖	8.5	3.80 (−0.75 to 8.35)	0.10
Glycated hemoglobin			
Level (%)	5.3±0.6	0.01 (−0.09 to 0.11)	0.82
Level ≥6.5% (%)††	5.1	−0.93 (−4.44 to 2.59)	0.61
Diabetes			
Diagnosis after lottery (%)§¶	1.1	3.83 (1.93 to 5.73)	<0.001
Current use of medication for diabetes (%)§‖	6.4	5.43 (1.39 to 9.48)	0.008

Oregon Health Study

- Results - Biometrics

Variable	Mean Value in Control Group	Change with Medicaid Coverage (95% CI)†	P Value
Depression			
Positive screening result (%)‡‡	30.0	−9.15 (−16.70 to −1.60)	0.02
Diagnosis after lottery (%)¶¶	4.8	3.81 (0.15 to 7.46)	0.04
Current use of medication for depression (%)∥∥	16.8	5.49 (−0.46 to 11.45)	0.07
Framingham risk score (%)§§			
Overall	8.2±7.5	−0.21 (−1.56 to 1.15)	0.76
High-risk diagnosis	11.6±8.3	1.63 (−1.11 to 4.37)	0.24
Age of 50–64 yr	13.9±8.2	−0.37 (−2.64 to 1.90)	0.75

- Results Summary

- Absolute vs. relative effect sizes
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    - Relative change $= 2.1/6.7 = 31.3$ *percent*

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- Results Summary - Administrative Data:
    - ▶ Hospital Care
        - Hospital admissions ↑ 31.3% (p=0.004)
        - Non-ED LOS ↑ 20% (p=0.329)
        - Non-ED hospital charges ↑ 39% (p=0.077)
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  - Biometrics
    - Elevated blood pressure ↓ 0.8% (p=0.65)
    - High cholesterol ↓ 17% (p=0.37)
    - Framingham high-risk ↑ 14% (p=0.24)
    - Depression medication ↑ 33% (p=0.07)
    - Positive depression screening ↓ 31% (p=0.02)
    - Mortality ↓ 0.14% (p=0.638)

- Results Summary - Survey Data:
    - Preventive Care
        - Cholesterol check ↑ 18% (p<0.001)
        - Blood glucose check ↑ 15% (p<0.001)
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  - Mechanisms
    - Usual source of care ↑ 68% (p<0.001)
    - Got all needed care ↑ 35% (p<0.001)

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- The Oregon Medicaid Study found no statistically significant effects of winning the lottery on biometric measures of health. Frakt argues that we should not interpret these findings as evidence that Medicaid does not improve health. Why not?
- What is the "Peltzman Effect" and how does it apply to the findings from the Oregon Health Study?

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- *"Results from the randomized evaluation showed that Medicaid substantially improved self-reported health. However if we analyzed the same data using observational methods rather than taking advantage of the randomization, results suggested that Medicaid actually worsens these same self-reported health measures."*

Randomization vs. Regression

- How important is selection bias in this case?

Primary Payer Status Affects Mortality for Major Surgical Operations

Damien J. LaPar, MD,* Castigliano M. Bhamidipati, DO,* Carlos M. Mery, MD, MPH,* George J. Stukenborg, PhD,† David R. Jones, MD,* Bruce D. Schirmer, MD,* Irving L. Kron, MD,* and Gorav Ailawadi, MD*

Multivariable logistic regression was performed to calculate the adjusted odds of in-hospital death and in-hospital complications among patients undergoing major surgical operations. All preoperative variables entered as covariates (patient age, gender, elective operative status, mean income, hospital geographic region, teaching hospital status, type of operation, primary payer status, and categories for comorbid disease) were selected a priori based upon established clinical risk or were considered potential confounders for the effect of payer status among patients. All covariates contributing cases to each estimated outcome,

Randomization vs. Regression

	Private	Medicare	Uninsured	Medicaid
Mortality	1.00	1.54	1.74	1.97
Length of Stay	7.38	8.77	7.01	10.49
Total Costs	63,057	69,408	65,667	79,140

Medicaid Is Worse Than No Coverage at All

New research shows that patients on this government plan fare poorly. So why does the president want to shove one in four Americans into it?

By Scott Gottlieb
Updated March 10, 2011 12:01 am ET

Medicaid's awful results: Column

Glenn Harlan Reynolds
Published 11:48 a.m. ET Nov. 11, 2013

CRITICAL CONDITION

Mar 2, 2011, 12:23pm EST

Why Medicaid is a Humanitarian Catastrophe

Avik Roy Forbes Staff
The Apothecary Contributor Group ⓘ

Policy

Commentary from Forbes' Policy Editor

UVa Study: Surgical Patients on Medicaid Are 13% More Likely to Die Than Those Without Insurance

By AVIK ROY | July 17, 2010 11:36 PM